Homicide Trends 1947-1996: Short-Term Versus Long-Term Factors

Thomas B. Marvell, Justec Research
155 Ridings Cove, Williamsburg, VA 23185

This paper presents and analyzes homicide trends for 1947 to 1996 at the national, regional and state levels. National trends are compared to those for other crimes. Long-term trends usually differ greatly between series, but the short-term trends are usually similar. The latter probably results from powerful national factors that drive crime rates everywhere in the country in a similar manner, such as nationwide prison populations. The differences in long-term trends result from secular forces that have different impacts in different areas and for different crime types. For example, although homicide rates are highly correlated with other crime rates, they have grown hardly at all since 1947, whereas other crimes have experienced tremendous growth. A likely partial explanation is that improved emergency services mean that fewer assault victims die.

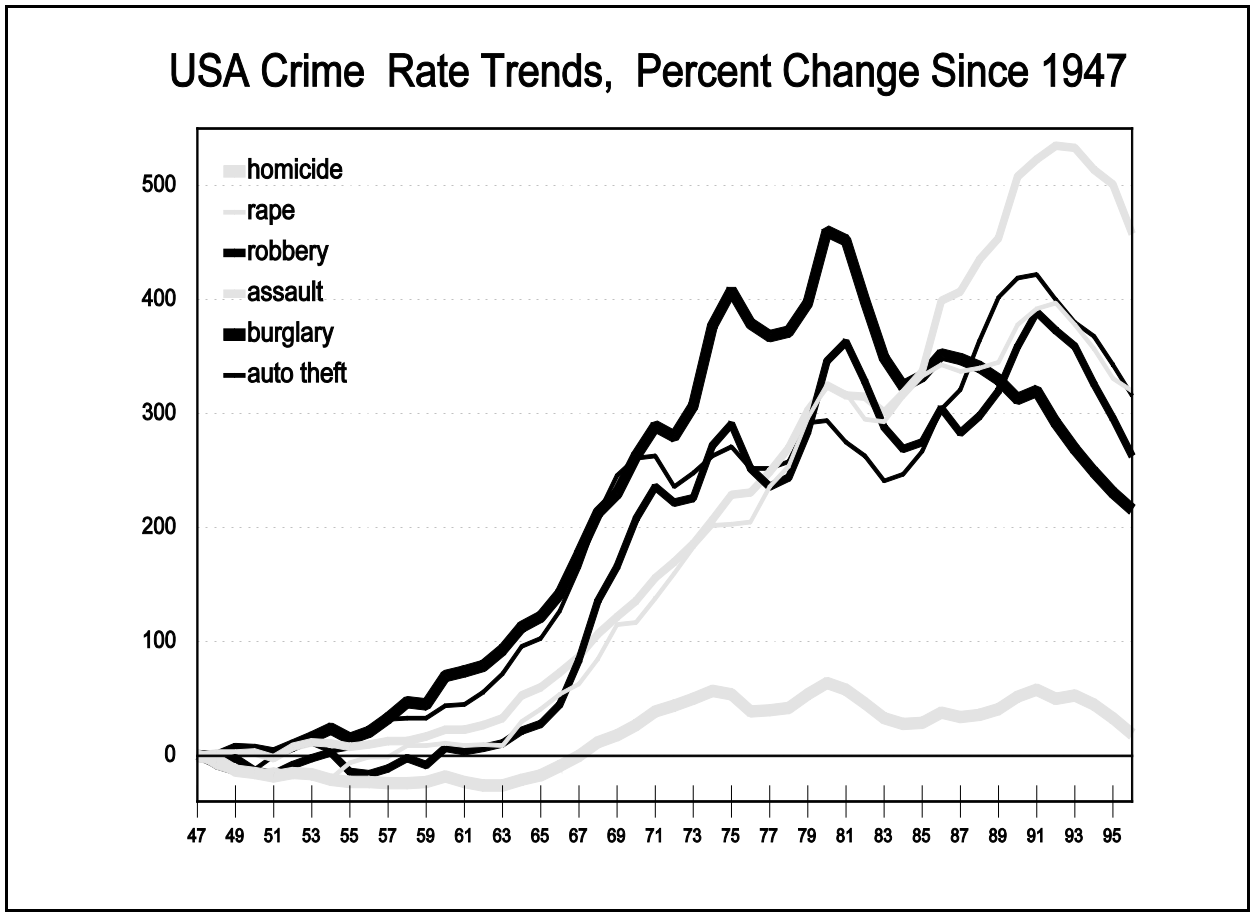
Trends in National Homicide and Other Crimes

The first topic is aggregate national homicide rate trends, especially as compared to trends for other types of crimes (Figure 1). Crime is measured by crime reported to the police, as compiled in the FBI's Uniform Crime Reports (FBI 1997 and earlier years; Office of Management and Budget, 1974). Besides homicide, data are available since 1947 for rape, robbery, aggravated assault, burglary, and motor vehicle theft. The beginning year is 1947 because that avoids the dislocations caused by World War II and its aftermath. The latest year with available data is 1996. The crime figures are divided by population.

The pattern is striking. Homicide rates grew hardly at all, by 19% from 1947-96. The other UCR crimes experienced tremendous growth: 320% for rape, 263% for robbery, 458% for assault, 216% for burglary, and 316% for auto theft. That is, the other crimes grew some 10 to 20 times as much as homicide.

This difference is especially odd for three reasons. First, because most criminals do not specialize in crime (e.g., Kempf, 1987), one would expect the various crime types to move roughly in the same manner. This is true for the other five UCR crimes in Figure 1, but not for homicide. Second, most homicides are very similar to aggravated assaults, differing only in that the assault resulted in a death (Harries, 1990). But there is an extreme difference between long-term trends for homicide and aggravated assault in Figure 1.

FIGURE 1



Third, and most important, in spite of the apparent differences between trends in homicide and other crimes, the trends are highly correlated. Table 1 presents the correlations between the various crime rates. There are two sets of correlations, those between the actual rates and those between the percent change in rates. The correlations between actual rates (in "levels") probably overstate the relationships due to stochastic trending and autocorrelation. Correlations between percent changes (which are essentially first differences of logged variables) are unlikely to encounter such problems, but they suffer the opposite bias, understating the relationship. There are two reasons for the bias: 1) percent changes can be greatly affected by errors in the data, and 2) correlations between percent changes tap only very short term relationships, ignoring those that do not fall precisely within a time frame for which the two series are related. (Correlations with prewhitened variables are similar to those with percent changes and, because the variables are differenced, might also be biased downwards.) The "true" correlation, if there is such a thing, is likely to fall somewhere between the correlations with levels and those with percent changes.

Table 1. Correlations Between Crime Rates, 1947-96

	Homicide	Rape	Robbery	Assault	Burglary	Auto
Homicide	--	.89	.96	.82	.93	.90
Rape	.61	--	.97	.98	.86	.95
Robbery	.74	.35	--	.93	.93	.96
Assault	.82	.51	.67	--	.76	.94
Burglary	.59	.31	.83	.56	--	.87
Auto	.62	.50	.58	.57	.53	--

The correlations are for 1947-96 national crime rates. Variables expressed as levels (the actual crime rates) are above the diagonal, and variables expressed as percent changes are below the diagonal. All correlations are significant at the .05 level.

In spite of the tremendous differences in long-term trends, the correlations between homicide and other crimes are high -- probably as high as one ever encounters in criminology. In levels, the correlations are nearly as high as those between the other crime rates even though the other crime trends seem to bunch together, but not with homicide. Using percent changes, the correlations between homicide and the other crimes are actually much larger than the correlations between crimes, averaging .68 and .54 respectively.

These findings are reinforced by Table 2, where homicide is regressed on the five other crime types. The results do not depended on whether the variables are expressed as levels or as percent changes. The coefficients are elasticities, which is the percent change in homicide associated with each one percent change in the particular crime rate. Assault has the closest relationship with homicide, followed by rape and robbery, as one would expect. Burglary and auto theft have little relationship after controlling for the other crimes. That is, the common factors behind homicide and burglary (or auto theft) that lead to the high correlations in Table 1 are also factors that lead to the high correlation between homicide and violent crimes.

Table 2. Regressing Homicide on Five UCR Crimes

	levels		percent changes	
	Coef.	t	Coef.	t
Rape	.20	2.60	.21	2.67
Robbery	.19	2.19	.23	2.60
Assault	.45	3.48	.57	4.30
Burglary	.06	.73	-.08	.74
Auto Theft	.12	1.57	.06	.75
Intercept	5.35	11.08	-2.92	5.17
Trend	-1.98	7.57	–	--

These are generalized least squares regressions, with national UCR homicide rates for 1947-96 as dependent variables and other UCR crimes as independent variables. Variables are logged in the levels analysis. The regression R-squares are .91 and .78.

Two additional features of Table 2 are noteworthy. First, the coefficients on the individual crimes total to 1.0 in both regressions. A one percent growth in all the other crimes is associated with a one percent growth in homicide. This implies that short-term homicide changes are mainly determined by whatever factors cause changes in the other crimes. Exactly what these factors are is outside the scope of the present study. However, because the breath of their scope makes them the most important factors that affect crime rates, they should be the prime focus of criminology research.

The second feature is the large impacts of the trend variable (that is, a counter) added to the regression with levels and of the intercept in the regression with percent changes (the intercept here is functionally similar to the trend term in the levels analysis). This suggests that there is a very large linear trend effect that affects the other UCR crime but not homicide. This effect applies throughout, applying with approximately the same force for each year.

In sum, homicide trends are very similar to trends for other crimes, except for the slopes. Because the slopes are based on long-term trends, the gist of Figure 1 and Tables 1 and 2 is that short-term changes in homicide are close to those for other crimes, but the long-term changes are very different. The difference between short-term and long-term trends means, in effect, that the yearly percent change in the other crimes is larger than that for homicide by the roughly same amount each year, averaging about 2% to 3% depending on the crime.

This is most evident for assault, which again is closely associated with homicide. Even though it grew more than other crimes (Figure 1), the correlation between percent changes in it and homicide is .82 (Table 1), which is an extraordinarily high figure when dealing with percent changes. The next highest correlation is .74 for robberies, which is also a crime associated with homicides.

What then causes the differences between the long-term trends homicide and those for other crimes? As discussed above, the causes must have a continuing impact that does not change much from year to year. To my knowledge there are only two likely explanations, changes in the amount of unrecorded crime and changes in the odds that an assault will result in a death.

As general rule, the portion of crimes that end up as crime statistics has increased substantially. In the Crime Victimization Survey, respondents were asked whether they had reported crimes against them to the police, and there is a consistent series of responses from 1973 to 1992 (the Survey methodology was changed in 1993). The percent reporting for those two years were: 44% and 53% for rape, 51% and 51% for robbery, 52% and 62% for assault, 46% and 54% for burglary, and 67% and 75% for auto theft. Assuming that the growth rate for reporting rates is constant, extrapolation from these 19 years suggests that increase reporting account for 58% of the rape growth between 1947 and 1996, 55% of the assault growth, 48% of the burglary growth, and 33% of the auto theft growth. There is no apparent change in robbery reporting.

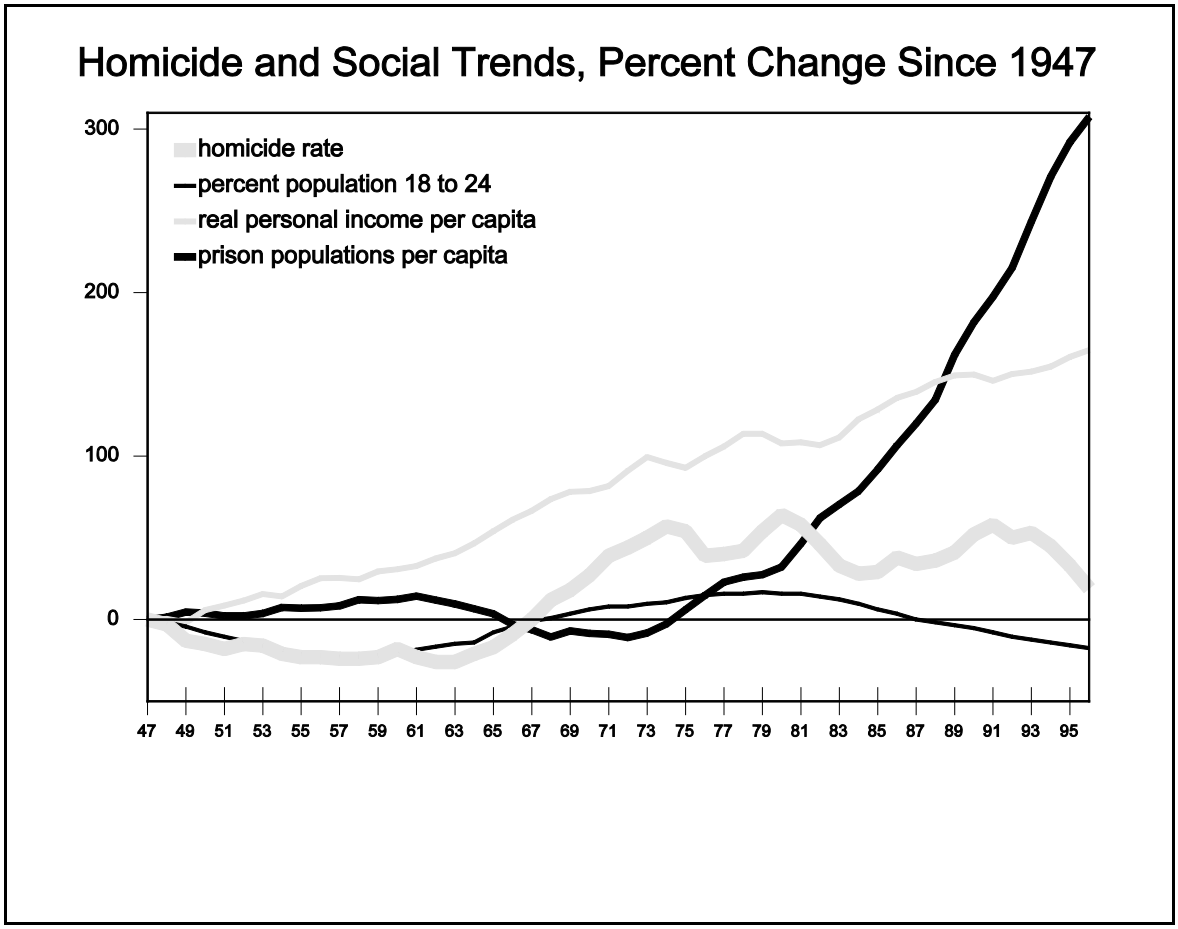
This allows one to adjust the overall growth in Figure 1 for reporting changes. The 1947-96 growth for homicide stays the same, at 19%, under the likely assumption that homicides are nearly always reported. After adjusting for reporting changes, the 49-year growth is 134% for rape, 263% for robbery, 206% for assault, 112% for burglary, and 212% for auto theft. Although this growth is much less than that in Figure 1, it is still sizeable and much larger than growth in homicides. I emphasize, however, that these adjustments are crude. The reporting changes before 1972 might not be similar to those afterwards. Also, the adjustments are only for reporting changes and do not take into consideration changes in police recording of crimes reported; increase recording is especially likely for rape and sexual assault. Nevertheless, the evidence is strong that homicide growth is much less than the growth of other crimes.

The second likely explanation for why homicide trends do not match those for other crimes, especially assault, is improvements in trauma care. After all, if some assault victims survive in 1996 but would not have in 1947, the 1996 homicide rates have been reduced. Improvements in trauma care have taken many forms: quicker reporting of injuries, speedier ambulance service, better professional care while on route to the hospital, greater knowledge about how to treat injuries, and greater available of surgeons versed in treating wounds. Especially important are the gradual adoption of trauma systems in most states over the past four decades. Criminology research tentatively suggests that improved treatment of injuries has reduce homicide, but gives no indication of the extent (Doerner, 1988; Doerner and Speir, 1986; Lattimore et al., 1997).

Trends in Homicides and Associated Factors

Figure 2 graphs homicide rate trends and trends for three factors often said to be associated with homicide. These are 1) the percent 18 to 24 years old, which is the age group with the highest arrest rate for homicides, 2) real per-capita personal income, which is probably the most accurate indicator of economic well being, and 3) prison population per capita, which measures the possible deterrent and incapacitation impacts of imprisonment. The correlations between these three and homicide are much smaller than the correlations between homicide and other crimes (Table 1). There appears to be a close relationship between homicide and age structure until 1967, and a negative relationship between homicide and prison populations through the early 1980s. However, the existence of several causal factors makes interpretation of Figure 2 difficult. In fact, the major import of Figure 2 is that bivariate comparisons have limited utility when attempting to estimate the impact of specific causal factors, when many causal factors are involved. Elsewhere using multiple regression, which can distinguish between the impact of the several causal factors, Marvell and Moody (1997) found that prison population size is by far the most important factor influencing homicide trends, with demographic and economic factors only moderately important. They also found that without control variables, which affect both homicides and prison populations, there is little evidence of a relationship between these homicide and prisons.

Figure 2



Homicide Types

Figure 3 presents three separate pairs of homicide types: 1) gun and non-gun, 2) female and male victims, and 3) white and nonwhite victims. Table 3 presents the correlations between these pairs. The data are from Vital Statistics victimization taken from death certificates, and 1995 is the last year available (National Center for Health Statistics, 1997 and earlier editions).

The interesting fact here is that the female and male homicide trends are much closer than the other two pairs of trends. Gun homicide rates have increase much more than non-gun rates, and white rates have increased much more than nonwhite rates. As will be seen presently, however, the latter two are largely the result of differences between homicide trends for different parts of the country.

Figure 3

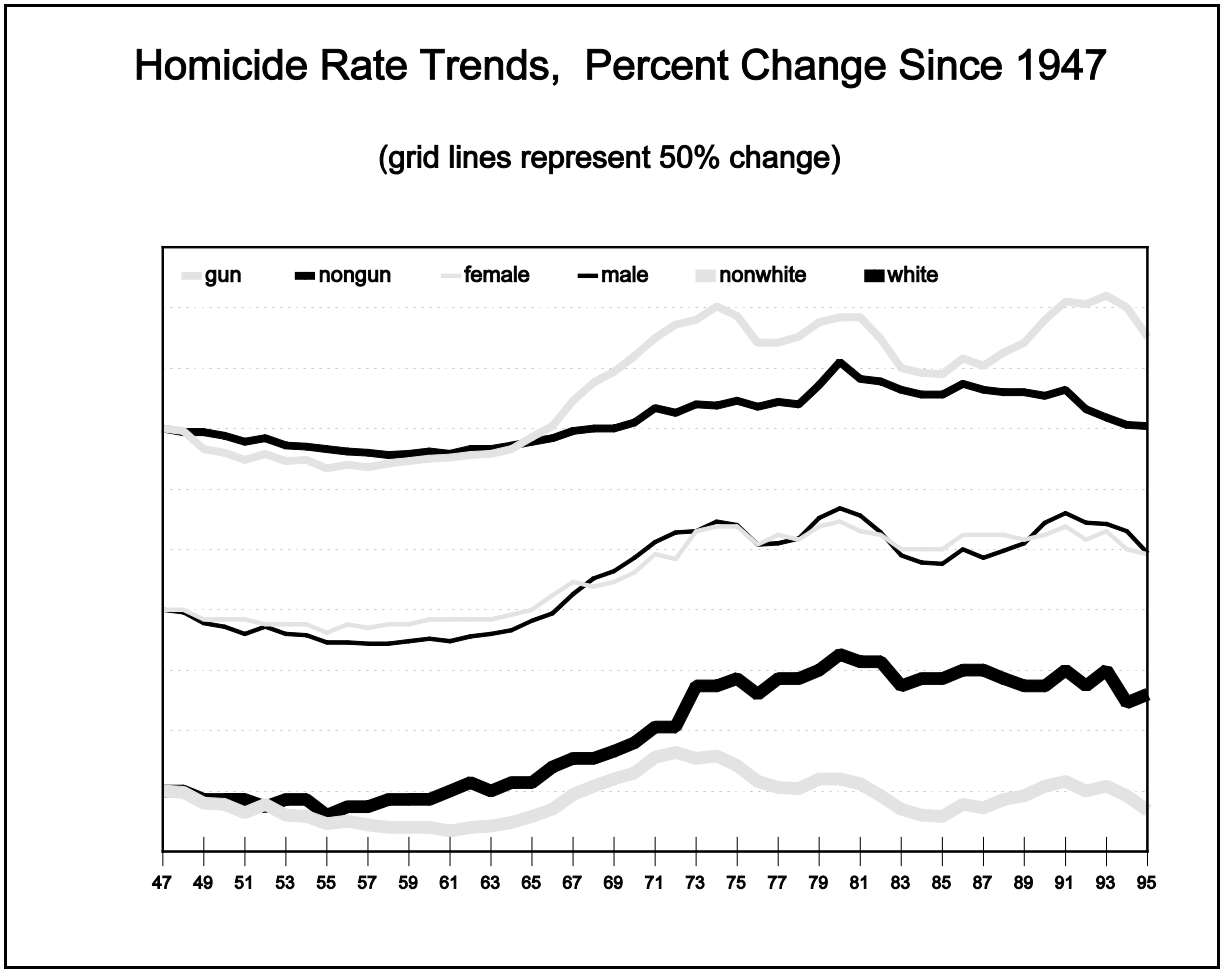


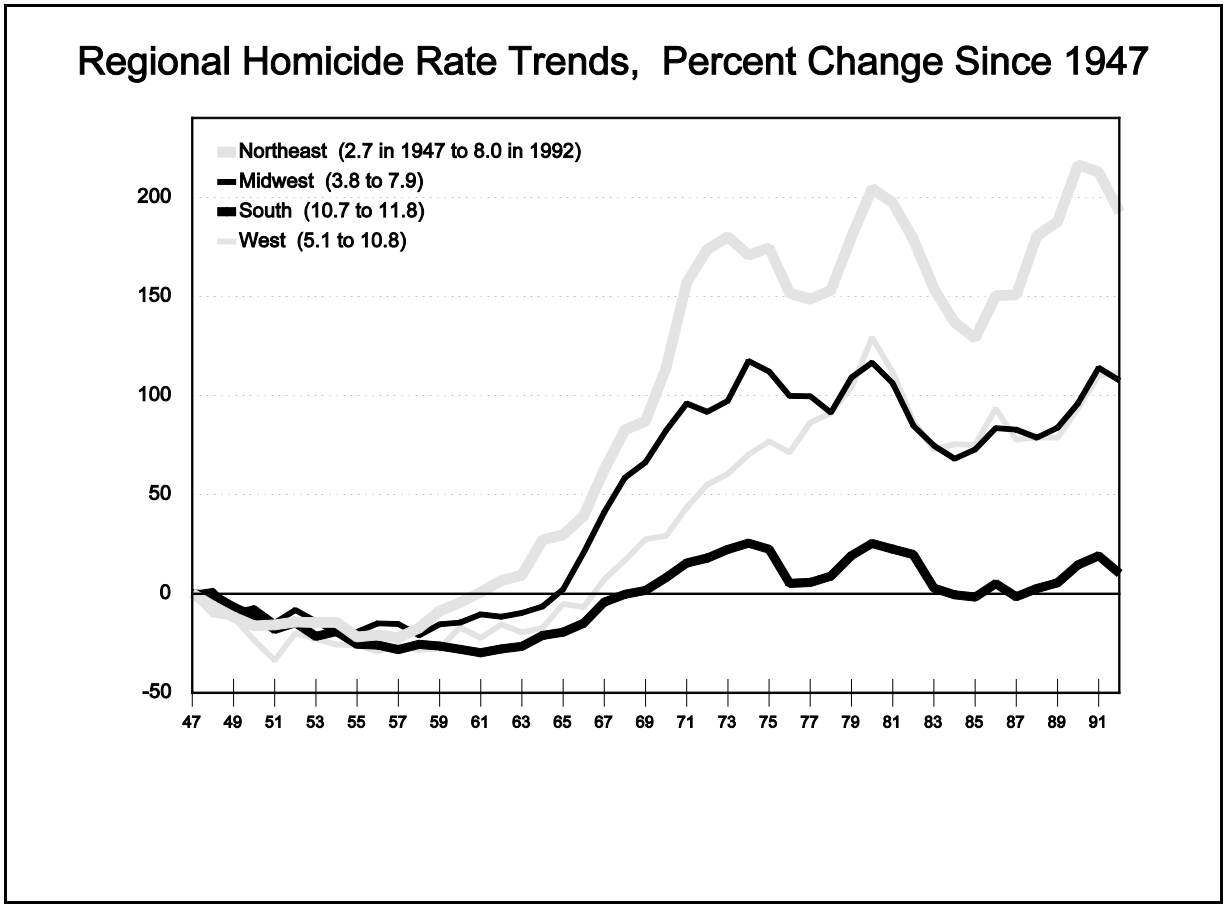
Table 3. Correlations Between Homicide Types, 1947-95

	Gun & Non-Gun	Male & Female	White & Nonwhite
Levels	.83	.98	.56
Percent Changes	.49	.57	.30

Regional Homicide Rates

It is well known that homicide rates are much higher in some sections of the country, especially the South. It is not as well known that homicide trends also differ greatly between regions. Figure 4 divides the states into census regions (for the states in each region, see Federal Bureau of Investigation, 1997). The data are based on aggregation of the individual state vital statistics data, for which homicides are categorized by state of occurrence. The last year with state data is 1992.

Figure 4



Homicide rates in the South are remarkably flat over the 1947-92 period, but rates in the Northeast nearly tripled. Rates in the other two regions, Midwest and West, doubled. These trends are mainly movements towards the average: The homicide rate in the South started at four times that for the Northeast and more than twice those of the Midwest and South. In 1992 the South still had the highest rate, but it was less than 50% higher than rates in the other regions. The differences between regional trends probably explain the differences between white and nonwhite homicide trends in Figure 3. Since the South has more nonwhites, the relatively lower homicide growth there translates into relatively low homicide growth for nonwhites.

Table 4. Regional-Level Correlations, 1947-92

	Homicide Rates				Percent With Guns			
	NE	MW	S	W	NE	MW	S	W
Northeast	--	.98	.89	.97	--	.81	.67	.90
Midwest	.55	--	.93	.95	.38	--	.92	.82
South	.77	.63	--	.87	.34	.48	--	.76
West	.48	.52	.58	--	.19	.38	.32	--

Levels above the diagonals and percent changes below.

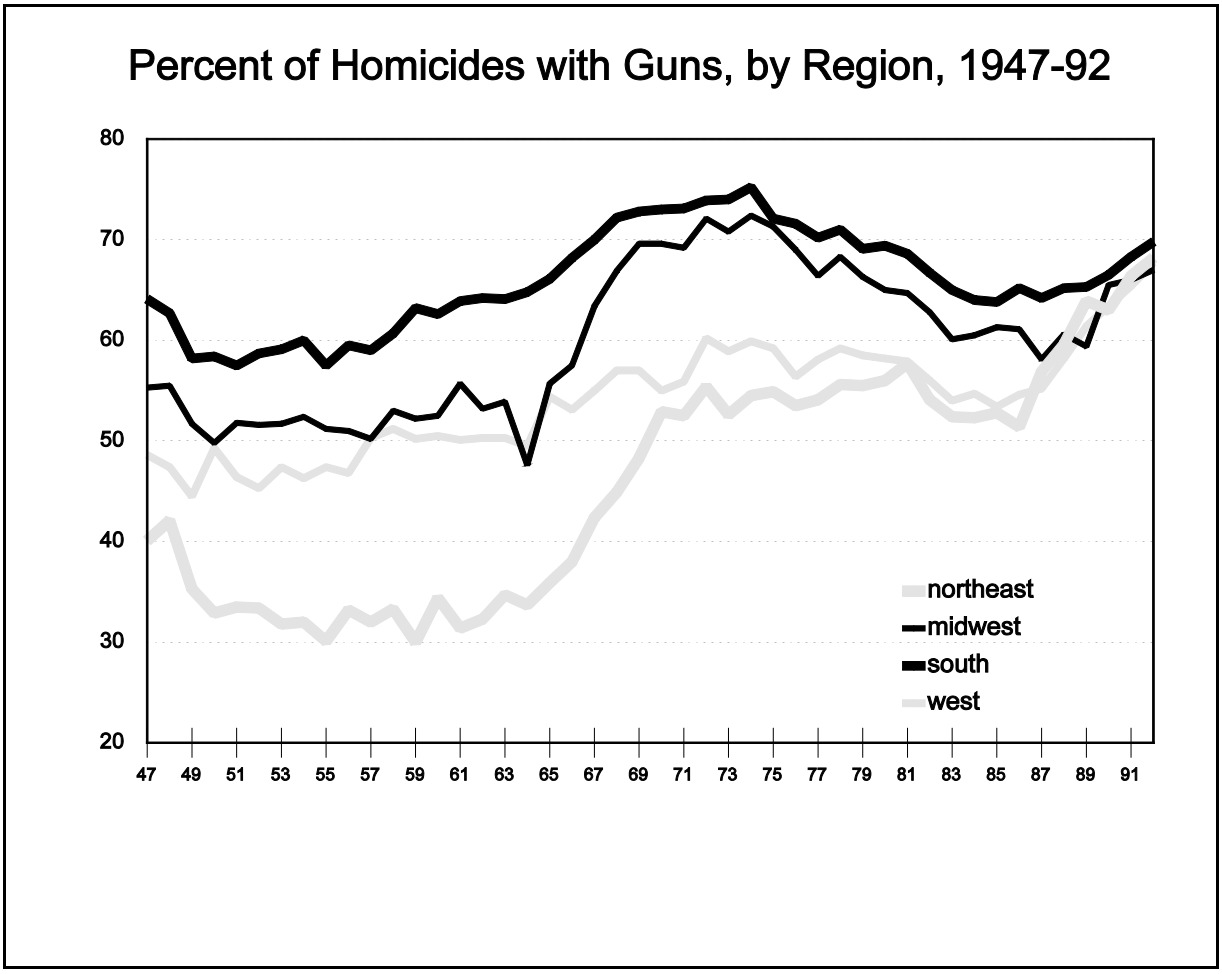
The differences between regional trends, therefore, are similar in magnitude to the differences between homicides and other crimes (after taking into account reporting changes). Similarly, in spite of the huge long-term differences, the short-term regional changes do not differ substantially. On average the correlations between regional trends, whether expressed as levels or percent changes, are very similar to correlations between crime types (Tables 1 and 4). Correlations between the South and other regions are slightly less than correlations between the other regions when expressed as levels, but they are larger when expressed as percent changes.

Another example of movement towards the average is found in the percent of homicides by guns (Figure 5). Large differences between the regions persisted until the early 1960s, with the South having the largest percentage, around 60%, and the Northeast having the smallest percentage, a little more than 30%. In the Midwest and West about 50% of homicides were with guns. Since the early 1960s the percentage figures increased in all areas, but the increase varied inversely with the magnitude of gun use. In the end, by 1992 the figures are almost the same for all regions, at just under 70% (Figure 5). As result, the comparatively large growth of gun homicides since the 1960s (Figure 3) is due mainly to the growth in the Northeast.

The series in Figure 5 differ from the series in Figures 1 to 4 in that the correlations between the trends are quite small. Although all trends in Figure 5 are generally upward, the year-to-year

changes are not at all similar. There appears to be little short-term similarity between gun use regions.

Figure 5



State-Level Analysis

Again, State-level homicide data are for 1947-92. Table 5 lists the percent change in homicide rates in 48 states (excluding Alaska and Hawaii). The differences between states are startling. Eight, mainly Southern states, experienced declines, whereas homicide rates at least doubled in fifteen states. (Changes in small states might be misleading because they usually had so few homicides in 1947 that one more or one less homicide can have a large impact on the percent growth for 1947-92.) Some of the largest increases are found in large industrial states: California, Connecticut, Illinois, Massachusetts, Michigan, Minnesota, New York, Pennsylvania, and Wisconsin. The 310% increase for New York stands out, and the recent drop in homicide rates there can be seen as a long overdue adjustment to match the growth rates elsewhere.

Table 5. Percent Change in Homicide Rates by State, 1947-92

Alabama	-14%	Maine	107%	Ohio	25%
Arizona	63%	Maryland	62%	Oklahoma	22%
Arkansas	54%	Massachusetts	162%	Oregon	99%
California	130%	Michigan	195%	Pennsylvania	119%
Colorado	59%	Minnesota	184%	Rhode Island	105%
Connecticut	178%	Mississippi	17%	South Carolina	-12%
Delaware	27%	Missouri	90%	South Dakota	140%
Florida	-31%	Montana	93%	Tennessee	-2%
Georgia	-20%	Nebraska	63%	Texas	30%
Idaho	16%	Nevada	2%	Utah	18%
Illinois	148%	New Hampshire	250%	Vermont	163%
Indiana	81%	New Jersey	61%	Virginia	16%
Iowa	-3%	New Mexico	20%	Washington	72%
Kansas	52%	New York	310%	West Virginia	7%
Kentucky	-46%	North Carolina	8%	Wisconsin	256%
Louisiana	88%	North Dakota	416%	Wyoming	-33%

In spite of the differences in 1947-92 homicide growth rates, the correlations between pairs of states are generally positive. Table 6 give the mean correlation coefficients between states (that is, it averages hundreds of separate correlations). The correlations, although positive, are low compared to those between regions (Table 6). This is largely due to the erratic nature of homicide data in small states because they have few homicides in any one year. The correlations between rates in the ten largest states are somewhat higher (Table 6).

Table 6. Average Correlations Between State Homicide Rates

	Levels	Percent Changes
48 States	.52	.12
10 Largest States	.67	.33

The final analysis, in Table 7, is a more complex procedure for estimating the similarity of state and federal trends. This presents the results of six regressions with homicide rates over 1947-92 as the dependent variable in each. The main independent variable is national crime rates and sixteen economic, demographic, and other control variables. The variables are percent changes. The regression is weighted by population to avoid heteroscedasticity, and two lags of the dependent variable are added to correct for autocorrelation. The only difference between the six regressions is the national-level crime variable (for homicide this variable is national homicides less homicide in the state, a transformation that is not possible for other crimes due to the lack of state data in the early years).

Table 7. Correlation of State Homicide with USA Crime, 1947-92

Homicide	.95	(14.1)	**Assault**	.91	(9.6)
Rape	.28	(4.3)	**Burglary**	.58	(9.1)
Robbery	.49	(11.9)	**Auto**	.42	(6.3)

This table contains coefficients (and t ratios) on national crime from six multiple time series regressions with vital statistics state-level homicide rates as dependent variables and national-level crime rates among the dependent variables. The variables are percent changes. The regressions contain 16 additional independent variables as controls, and the sample size is 2,182.

The coefficient is .95 for the national-level homicide variable (Table 7); because the variables are percent changes, this means that a one percent change in national homicide is associated with almost the same change in individual states on average, apparently because the factors that affect

changes in one state are those that affect changes in other states. The t-ratio of 14.1 is extraordinarily high and suggests that the size of yearly changes in the states are similar (after taking into account yearly changes due to secular trends). The coefficient on national assault rates is nearly as large, .91, which again suggests that factors that cause changes in assault rates throughout the country are the factors that cause changes in each state's homicide rates.

Conclusion

In a nutshell, short-term factors tend to be broad, and long-term factors are mainly local or otherwise have narrow scope. As a general rule, the various crime trends -- whether for different crime types, subcategories of homicide or regions of the country -- are very similar in the short run but differ greatly in the long run. That is, the series are highly correlated but their 1947-96 growth varies tremendously. The difference between short-term and long-term trends results from the fact that the short-term trends are similar across the various series except for an additional growth element, specific to each series, that is similar from year to year for the particular series. The general rule, however, applies less strongly when comparing gun and non-gun homicide and when comparing homicide rates in individual states, especially small states.

These conclusions have three major implications. First, criminologists have seldom, if ever, considered the existence of broad, over-arching forces that drive crime changes across various categories of crime types and all regions. This means that the tendency in criminology towards disaggregation is likely to miss important factors, which might be called a "disaggregation bias." I did not here study what these national effects are, but in other research we have found that national levels of prison populations have very large (negative) associations with local state crime rates for homicide and the other UCR crime types (Marvell and Moody, 1998). Another candidate is inflation levels, which differ little from state to state.

Second, local effects and crime-specific effects are mainly secular effects. In contrast, when researchers or the public evaluate the impact of politicians and the criminal justice system on crime, they look at short-term changes. Evaluation of the impact on long-term changes requires the passage of too much time to be practical. This means that politicians, police, and others who might have some power to affect crime rates tend to be evaluated on outcomes (short-term crime-rate changes) that are mainly beyond their control. Consequently, it is very difficult to evaluate crime-reduction programs, and it is impossible to evaluate them without taking into account what is going in the rest of the country. (Although this study concentrates on homicide, these conclusions apply to other crimes as well.)

Third, although factors that affect local and crime-specific trends are obviously important, as a practical matter for policy purposes factors that operate at the national level and across crime types are more important. The reason is obvious. Local and crime-specific factors have narrow impacts; factors that operate nationally and across crimes have broad impacts.

References

Doerner, W.G., and J.C. Speir. 1986. Stitch and Sew: The Impact of Medical Resources Upon Criminally Induced Lethality. *Criminology* 24:319-330.

Doerner, W.G. 1988. The Impact of Medical Resources on Criminally Induced Legality: A Further Examination. *Criminology* 26:171-179.

Federal Bureau of Investigation. 1997. *Crime in the United States: Uniform Crime Reports*. Washington, DC: Government Printing Office.

Kempf, K.L. 1987. Specialization and the criminal career. *Criminology* 25:399-420.

Lattimore, P.K., J. Trudeau, K.J. Riley, J. Leiter, and S. Edwards. 1997. *Homicide in Eight U.S. Cities: Trends, Context, and Policy Implications*. Washington, DC: National Institute of Justice.

Marvell, T.B., and C.E. Moody. 1997. The Impact of Prison Growth on Homicide. *Homicide Studies* 1:205-233.

Marvell, T.B., and C.E. Moody. 1998. The Impact of Out-of-State Prison Populations on State Crime Rates: Free-Riding and Displacement Effects. *Criminology* 36:(In Press)

National Center for Health Statistics. 1997. *Vital Statistics of the United States*. Washington, DC: Government Printing Office.

Office of Management and Budget. 1974. *Social Indicators, 1973*. Washington, DC: Government Printing Office.